TABLE III—*FP10s by age, issued to miners and non-miners in skilled and semi-skilled manual occupations required to pay 20p per item (dispensed and not dispensed)*

Age (completed years)	Total FP10s		No of FP10s not dispensed		% of FP10s not dispensed	
	Miners	Non-miners	Miners	Non-miners	Miners	Non-miners
16–24	6	15	2	2	33	13
25–34	26	45	11	10	42	22
35–44	27	36	9	1	33	3
45–54	41	19	10	1	24	5
55–64	36	20	5	1	14	5
Total	136	135	37	15	27	11

difference was significant ($\chi^2 = 10{\cdot}3$; $P < 0{\cdot}01$). Details are shown in table III, which also breaks the figures down by age. In both groups the peak age range for undispensed FP10s was 25-34 years but the figures for miners were higher throughout the working-age range.

The nature of the drugs not collected by the working-age men without exemption certificates showed a logical pattern within the limitations imposed by the size of the sample. Drugs affecting the cardiovascular system and moderate or strong analgesics were rarely rejected (3% and 8% respectively). These drugs tend to be prescribed to the older workers. By contrast, the mild analgesics were rejected in 27% of cases. Drugs prescribed largely for symptomatic relief such as those affecting the alimentary system, cough mixtures, and skin preparations were rejected in 27%, 18%, and 17% of cases respectively, but hypnotics, sedatives, tranquillisers, and antidepressants were rejected in only 6% of cases. It is a matter for concern that 11% of antibiotics were rejected.

Discussion

The overall percentage of undispensed FP10s was close to the figure we had expected at the outset, but some features of the distribution were unexpected. We thought, for example, that old people might fail to obtain drugs owing to the difficulties of getting to chemists. Nevertheless, it seemed that by one means or another these difficulties were overcome.

Most of the undispensed drugs had been prescribed for younger working men, and particularly for miners. A series of earlier studies in this practice have shown a high demand for sickness certification among miners.[2 3] They have also shown a distinct drop in medical work load among miners compared with non-miners after retirement at the age of 65 years,[4] and a marked drop among miners retired early for health reasons compared with age-matched miners who continue at work.[5] These findings arise out of the necessity to consult a doctor in order to get sickness benefit, but, so far as many of the younger men are concerned, the medical content of the consultation in these circumstances is perceived by them as irrelevant and the medication is rejected.

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References

1 Comaroff, J, *et al*, *Studies in General Practice. Preliminary Report*, **1**, 13. Medical Sociology Research Centre, University of Wales, 1971.
2 Rider, J G, *et al*, *Journal of the Royal College of General Practitioners*, 1969, **17**, 361.
3 Lunn, J E, *et al*, *Journal of the Royal College of General Practitioners*, 1970, **19**, 215.
4 Lunn, J E, and Waters, W H R, *British Journal of Social and Preventive Medicine*, 1969, **23**, 253.
5 Waters, W H R, *et al*, *Journal of the Royal College of General Practitioners*, 1970, **20**, 328.

Problems of Childhood

Immunisations

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Immunisation policy needs frequent review if it is to remain specifically appropriate for the population concerned. The following recommendations for children are an attempt to strike three balances: between current needs and current resources; between individual and community benefits; and between the risks of immunisation procedures and those of the illnesses they are designed to prevent.

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Diphtheria

Diphtheria vaccine should be given in three doses in infancy with a further dose at school entry (see table). The aim must still be to immunise all the population; immunisation does not prevent the carrier state, so that non-immune individuals are not protected by a high level of population immunity. A few cases still occur unnecessarily every year.

Children in residential institutions should be given a full course of diphtheria vaccine if there is doubt about their immunisation history. Those over 10 years old should first be screened by the Schick test to avoid severe vaccine reactions.

Whooping cough

Although the incidence of whooping cough has fallen as a result of the national policy of immunisation introduced in

1957, it is still a severe disease when it occurs, especially in infancy. The ratio of deaths to notifications has remained constant since 1954 (1:1000 for all ages, 1:100 for infants),[1] which argues against diminished virulence. The Joint Committee on Vaccination and Immunisation have made it clear[2] that they are unimpressed with the available evidence linking neurological illness with whooping cough vaccination, and that the hazard of whooping cough remains greater than that of immunisation.

Pertussis vaccine should therefore be given in three doses in infancy as part of "triple vaccine" (see table). If the recommended timing of these doses is followed a further boosting dose is not necessary. Every effort must be made to counter the adverse publicity given to whooping cough immunisation, as it already seems likely that the recent fall in acceptance will result in new epidemics, the first predicted for 1978. If this occurs it may be necessary to lower the recommended age for the first dose of vaccine.

Tetanus

Tetanus toxoid should be given in four doses in childhood as for diphtheria vaccine (see table). A further dose should be given when leaving school, and thereafter whenever injured if five years or more since the last dose.

For the non-immune, surgical treatment of the wound and penicillin remain essential; but human antitetanus serum is safe and should be used if the wound is thought to carry a high risk of tetanus.

Recommended schedule of routine immunisations in childhood (adapted with interpretation from Immunisation Against Infectious Disease, 1972[28])

Period	Vaccine
First year of life (6-8 weeks between 1st and 2nd doses; 4-6 months between 2nd and 3rd) eg:	
4 months 6 months 10 months	Diphtheria, tetanus, pertussis triple vaccine and oral polio vaccine
Second year of life eg:	
13 months	Measles
School entry	Diphtheria and tetanus double vaccine and oral polio vaccine
10-13 years	BCG
11-13 years (girls)	Rubella
School leaving	Tetanus toxoid and oral polio vaccine

Poliomyelitis

Live oral poliomyelitis vaccine prevents the carrier state by providing local intestinal as well as serological immunity. The vaccine virus is transmitted to non-immunised people, thereby increasing population immunity. These two properties, together with the acceptability of oral administration, have been largely responsible for the outstanding success of this vaccine.

Immunisation should be carried out by giving three doses of vaccine during infancy (see table). This enables each of the three virus strains included in the vaccine to infect independently. Once each vaccine strain has taken, immunity is long-lasting; but further single doses should be given on starting and leaving school to cover the occasional failure of a vaccine strain to infect, probably as a result of interference by a concurrent wild enterovirus infection.

Measles

Live vaccine should be given routinely near the beginning of the second year of life to children in Britain. Efficacy at a younger age is less certain and we do not have the problem that this poses for developing countries, where measles in infancy is common and has a high mortality. Every opportunity should also be taken to immunise older children without a history of measles or of immunisation, especially those with chronic illnesses and those in residential institutions.

The widespread and unpleasant morbidity associated with measles justifies every effort to prevent it, even in a country where the mortality is low. As time passes since introducing measles vaccine uncertainty about the duration of artificial immunity is becoming less. The vaccine may occasionally fail to prevent the disease, but there is evidence that in these children the illness is less severe.[3 4] Too often parents are not warned of the common but usually mild febrile reaction 5-12 days after immunisation. When the family or past history indicate a high risk of febrile convulsions, the most logical course would be to prescribe phenobarbitone for two weeks from the day of the immunisation, rather than leave the child susceptible to natural infection.

Tuberculosis

The proportion of indigenous children in Britain who are tuberculin-positive at 13 continues to be halved every five years, and is now about 9%. This suggests that control of tuberculosis may soon reach a point where routine immunisation with BCG is no longer justifiable. Nevertheless, the Joint Committee on Vaccination and Immunisation considers that this point has not yet been reached,[5] and it seems unwise and unnecessary to pre-empt official national policy when the immunisation in question is completely safe.

BCG should therefore be given routinely to all tuberculin-negative children from 10 to 13. Babies born into families with a history of tuberculosis (whether past, present, or doubtful) or into recent immigrant families must be immunised during the first week of life. Children arriving as immigrants from countries where tuberculosis is common should be immunised whatever their age.

All except the newborn should be tuberculin tested before immunisation as a screen for active tuberculosis and because extended local reactions may occur if BCG is given to those who are tuberculin-positive. Contacts require specialist management: it is often best to defer immunisation for a short period to avoid confusing the diagnosis of early active infection.

Rubella

Live vaccine, available in Britain since 1970, should be given to all girls from 11 to 13, regardless of a history of previous infection as this is notoriously unreliable. Not surprisingly, this policy, linked with only haphazard immunisation of adult women in the puerperium, has not yet resulted in a decreased incidence of congenital rubella. The Joint Committee on Vaccination and Immunisation therefore recommended in 1975[6] that all seronegative non-pregnant women should if possible be immunised. It is, however, impossible to be certain that unsuspected pregnancy does not already exist at the time of giving the live vaccine, or that a pregnancy will not be started within the following two months, which is the theoretical period of risk to a fetus. Rubella immunisation should therefore not be offered to adult women, however honourable their intentions, unless they can be shown serologically to be among the 10-20% who remain susceptible to the infection at this age. This is far from practicable in many areas, as laboratory facilities for serological screening on this scale are not widely available.

In the USA the policy of immunising all children from 1 to 12 has resulted after five years in a reduction in the incidence of congenital rubella,[7] presumably secondary to the simultaneous reduction in notified acquired infections. If artificial immunity, at present known to be adequate after seven years, can be shown to persist into adult life, this policy of immunising both sexes during early childhood, probably by means of a divalent vaccine with measles, would seem to be the most logical for the future.

The vaccine virus is not trasmitted, so that contact between vaccinees and pregnant women does not constitute a risk. The complication of arthropathy is less common now that certain vaccine strains have been incriminated and discarded.

Smallpox

It is now accepted that the risks of routine smallpox vaccination outweigh those of natural infection in Britain.[8] For this we have to thank the WHO smallpox eradication campaign, which, by its policy of search and containment, has reduced the number of endemic countries from 38 in 1967 to four in 1974 (Bangladesh, India, Pakistan, and Ethiopia). There appears to be no animal reservoir for smallpox, so that wars and migrations remain the only obstacles to the realistic goal of total eradication.

Influenza

Influenza is not necessarily mild in childhood.[9] It also seems likely that the infection is spread primarily by children, and that epidemics could be most effectively prevented by immunising the young if a vaccine of sufficient antigenic accuracy were available. World surveillance of influenza and the technique of genetic recombination of virus strains may result in the provision of adequate quantities of effective vaccine in time for the next influenza pandemic.

Meanwhile the killed vaccines available may provide more than 60% protection,[10] despite lagging behind the antigenic "drifts" of the wild virus. Despite its theoretical advantage of stimulating local as well as circulating antibody, the newly available live vaccine as nose drops has yet to be proved in the field, and does not include influenza B antigen.[11] Children with lung, heart, or other chronic diseases should therefore be considered for an autumnal yearly dose of killed vaccine, along with adults in the same categories.

Mumps

Live mumps vaccine is available in Britain, but has not been as widely used as in the USSR and the USA. Studies of the natural disease in Britain[12 13] have given a less severe impression of the complications than in the USA, and uncertainty remains about the true risk of sterility following orchitis, although it cannot be high as only 10-20% of cases are bilaterally affected. Mumps is certainly more often complicated in older patients and should feature alongside rubella on the menu at children's parties. Until there is more evidence about the persistence of artificial and long-term safety, vaccine should be reserved for special groups, such as postpubertal boys with serological evidence of susceptibility.

Travellers

The selection of vaccines for those travelling abroad, children as well as adults, has been well reviewed recently by Roodyn.[14]

Vaccines on the horizon?

Cytomegalovirus vaccines carry theoretical risks of latency and oncogenicity, which require further investigation before prevention of congenital infection with this virus can be attempted on a wide scale.[15]

Other experimental areas include several of the more common respiratory viruses,[16 17] *Mycoplasma pneumoniae*,[18] *Meningococci*,[19] *Haemophilus influenzae*,[20] varicella,[21] malaria,[22] and even dental caries.[23]

Contraindications

There are few absolute contraindications to routine immunisation procedures in childhood. The child with immunodeficiency or immunosuppression needs specialist individual consideration; although the risks from live virus vaccines are considerable, they may be lessened by simultaneous injections of human immunoglobulin and must be weighed against the increased severity of natural infection. Severe lung or heart disease are positive indications for measles immunisation, again covered by simultaneous human immunoglobulin. While whooping cough notifications remain at a low level, it is probably right to omit pertussis vaccine when there is a history of convulsions, or of neurological disorder, or even a strong family history of convulsions (more than one first-degree relative affected); the evidence for this recommendation is far from complete, and it will need to be reviewed if notifications increase, as seems likely for 1978. Egg hypersensitivity is a rare contraindication to measles, mumps, and influenza vaccines.

More harm has probably been done by postponing or omitting immunisation procedures mistakenly. This most commonly occurs in the baby with a cold. Babies have frequent upper respiratory tract infections, most of them mild and without systemic upset. Snuffles or coughs and colds without fever or change in general wellbeing should not be regarded as a contraindication to immunisation. There is no evidence that illnesses of this kind alter the efficacy or risks of vaccines. If a child is febrile or definitely unwell the immunisation procedure should be postponed, but for only a short period and with clear arrangements about the date of return. The policy of carrying through with the schedule if in doubt could with benefit replace the current overcautious approach.

Children out of step[24]

Whatever the length of interruption it is unnecessary to restart a course of triple (diphtheria, tetanus, and pertussis) vaccine, or of oral poliomyelitis vaccine, and every dose can be counted.

There is now evidence[25] that previous theoretical objections against simultaneous administration of more than one live vaccine were unfounded, so that, for example, poliomyelitis and measles vaccines may be given simultaneously, with no extra risks or appreciable loss of efficacy. This knowledge may be helpful for children who are behind with their immunisations and in reducing the number of visits for notorious defaulters.

General practitioners or clinic doctors?

The logic that preventive and curative medicine should, if provided by the same personnel from the same base, mutually enhance each other in their impact on the health of a community, has been confirmed most convincingly for developing countries.[26] The concept that this logic does not necessarily hold for more advanced societies has resulted in separating preventive services from primary care for most children in this country. Once again it has been the Scots who have led the way in pointing out the anomalies and disadvantages inherent in this system.[27] The question seems not to be whether immunisations are best given in a general practitioner's surgery or in a child health clinic, but how best to combine these services in a single team under the same roof.

Immunisation schedule—flexibility but fidelity

Although immunisation policy must remain flexible to meet changing needs, there are good reasons for doctors and health workers to adhere to the official recommendations of the day.[28] Evaluation of both the efficacy and the safety of a vaccine and of the prevalent risks of a particular infection are highly complex and best left in the hands of designated experts, such as the Joint Committee on Vaccination and Immunisation. Doctors were said to have been caught unawares by the wave of publicity against whooping cough immunisation early in 1974, but what they lacked to counter this heresy immediately and unanimously was faith in the existing official policy. Nor, for the same reasons, can one agree with recent suggestions[29] that the decision about BCG vaccination should be left to the individual parents.

Publicity and health education

It is to be hoped that most doctors and health workers are critical and intelligent individuals, and under direct pressure from an increasingly informed public. Faith in an immunisation policy must be based on an understanding of its foundations, communicated from the experts in detail and on a regular basis. Over 18 months elapsed between the "Nationwide" feature on whooping cough immunisation and the published reply by the Joint Committee on Vaccination and Immunisation,[2] although the information contained in this statement was available at the time of the television programme. Television must be harnessed to strengthen public acceptance of immunisation policy, not to undermine it, remembering especially that for most young parents diphtheria and poliomyelitis are insubstantial ghosts of the past. Moreover, school doctors and teachers need to look at methods of introducing more about disease prevention into school curricula.

References

1 Miller, C L, Pollock, T M, and Clewer, A D E, *Lancet*, 1974, **2**, 510.
2 Joint Committee on Vaccination and Immunisation of the Central Health Services Council and the Scottish Health Service Planning Council, *British Medical Journal*, 1975, **3**, 687.
3 Linnemann, C C, *et al*, *Journal of Pediatrics*, 1973, **82**, 798.
4 Cherry, J D, *et al*, *Journal of Pediatrics*, 1973, **82**, 802.
5 Chief Medical Officer, letter to Medical Officers for Environmental Health, 1975, CMO 26/75.
6 Joint Committee on Vaccination and Immunisation on Rubella Vaccination for consideration by Regional Medical Officers, 1975, unpublished.
7 Krugman, S, and Katz, S L, *New England Journal of Medicine*, 1974, **290**, 1375.
8 Dick, G, *British Medical Journal*, 1971, **3**, 163.
9 Brocklebank, T J, *et al*, *Lancet*, 1972, **2**, 497.
10 Pereira, M S, *et al*, *British Medical Journal*, 1972, **4**, 701.
11 *British Medical Journal*, 1975, **4**, 125.
12 Research Unit of Royal College of General Practitioners, *Journal of the Royal College of General Practitioners*, 1974, **24**, 545.
13 Association of the Study of Infectious Disease, *Journal of the Royal College of General Practitioners*, 1974, **24**, 552.
14 Roodyn, L, *British Medical Journal*, 1974, **4**, 648.
15 Hanshaw, J B, *American Journal of Diseases of Children*, 1974, **128**, 141.
16 Fulginiti, V A, *et al*, *American Journal of Epidemiology*, 1969, **89**, 435.
17 Kim, H W, *et al*, *Pediatrics*, 1973, **52**, 56.
18 Mogabgab, W J, *American Review of Respiratory Diseases*, 1973, **108**, 899.
19 Artenstein, M S, *Journal of the American Medical Association*, 1975, **231**, 1035.
20 Mortimer, E A, *Pediatrics*, 1973, **52**, 633.
21 Takahashi, M, *Lancet*, 1974, **2**, 1288.
22 *British Medical Journal*, 1975, **1**, 231.
23 *British Medical Journal*, 1975, **4**, 424.
24 Phillips, C F, *Pediatrics*, 1975, **55**, 877.
25 Karchmer, A W, *et al*, *American Journal of Diseases of Children*, 1971, **121**, 382.
26 Morley, D, *Paediatric Priorities in the Developing World*. London, Butterworths, 1973.
27 Stark, G D, *et al*, *British Medical Journal*, 1975, **4**, 387.
28 Health Departments of Great Britain and the Central Office of Information, *Immunisation Against Infectious Disease*. London, HMSO, 1972.
29 *Lancet*, 1975, **2**, 593.

Contemporary Themes

Dog bites and rabies: an assessment of risk

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With rabies continuing its march across Europe the threat to man in Britain is increasing. The greatest risk, given that any rabies infecting Britain would be fox-led as it is in continental Europe, is likely to be the domestic dog. With this in mind a study of dog bites inflicted on man in the absence of rabies should give some indication of the nature and size of the problem that would need to be managed should rabies arise.

Certain risk factors must be considered when deciding on postexposure treatment for rabies. These are: (*a*) age of victim—the risk of progression to clinical rabies is greater in young children than in adults; (*b*) site of bite—bites in densely innervated areas and places close to the central nervous system are the most dangerous. Thus, bites on the head, neck, and fingers cause most concern; (*c*) severity of wound—though rabies has been reported as occurring after very mild wounds and even licks by rabid animals, in general the more tissue destruction there is and the deeper the wound the more likely is rabies to follow: and (*d*) state of dog's health—when possible the state of health of the offending dog should be ascertained and the dog kept under observation for 10 days after the incident so that any change may be detected, antibody studies performed, and a necropsy done if the animal dies. Therefore bites from dogs whose whereabouts are unknown (wild and stray animals) are more worrying.[1]

Under certain circumstances a single criterion may be sufficient for a decision to use vaccine or serum, or both. For example a mild bite in any young child or a bite from an unknown dog might both be considered as meriting vaccine if other less certain criteria such as a lack of provocation are fulfilled.

These four main criteria have been used to indicate the probable size of the demand for treating dog bites.

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Material and methods

All cases of dog bite presenting at the accident and emergency department (AED) of Walton Hospital, Liverpool, from 1 November 1974 to 31 October 1975 were studied. Information on the total number of dog bites, the age of the victims, and, when possible, the site of the bite, was obtained from the AED register supplemented by individual record cards where the register was incomplete. The age grouping was used to establish the degree of comparability of a smaller sample that was studied in more detail (see below). The collection of information on the site of bite was abandoned because of a lack of precise information.

A more detailed analysis was made of all dog bites presenting from 13 October 1975 to 12 November 1975. The following information was obtained from each patient: personal details (age and sex); details of wound (site (marked on an outline figure) and severity,